CHROMOSOME CYTOLOGY OF *OLDENBURGIA* (ASTERACEAE—MUTISIEAE)[1]

PETER GOLDBLATT[2]

ABSTRACT

As determined from root tip mitoses, three of the four species of the endemic Cape genus *Oldenburgia* have the same diploid chromosome number, $2n = 36$, and a similar karyotype of small submetacentric to metacentric chromosomes. Base number in the genus is presumed to be $x = 9$, and *Oldenburgia* is probably a paleotetraploid relict. It has no close relatives in Africa, and it seems to be most closely related to a group of arborescent South American genera of Gochnatiinae, perhaps the most primitive subtribe of Mutisieae.

Oldenburgia is a distinctive and taxonomically isolated, southern African genus of Asteraceae tribe Mutisieae. It is currently being revised by Pauline Bond, and this cytological study was undertaken in conjunction with her work, the genus being unknown cytologically until now. *Oldenburgia* consists of four species, all of which occur in the Cape Province of South Africa, between Grahamstown in the east and the Tulbagh district in the west. All species are restricted to the nutrient-poor, sandstone-derived soils of the Cape geological system. All species are woody and *O. grandis* (syn. *O. arbuscula*) is a small tree. Mutisieae are poorly represented in Africa, but richly developed in South America, where several genera are arborescent.

MATERIALS AND METHODS

Counts were obtained from root tips harvested from germinating seeds. The root tips were treated in 0.003 M hydroxyquinoline for six hours at refrigerator temperatures, then fixed in 3 : 1 absolute ethanol-glacial acetic acid for two to five minutes, and stored in 70% ethanol. The roots were squashed in FLP orcein (Jackson, 1973) after a six-minute hydrolysis in 10% HCl at 60°C. Vouchers are cited in Table 1.

OBSERVATIONS

The three species examined have a diploid number of $2n = 36$ and similar karyotypes with relatively small chromosomes, 1.5–3 μm long. The chromosomes are too small to be easily characterized, but submetacentric pairs predominate and there are a few distinct metacentrics.

DISCUSSION

Oldenburgia is a member of the basal tribe Mutisieae of Asteraceae and is usually regarded as belonging to Gochnatiinae, possibly the most primitive of the four subtribes of Mutisieae (Cabrera, 1977). The genus is characterized by thick, coriaceous, spirally arranged leaves, large radiate capitula, and bilabiate florets with a well-developed pappus. Its affinities within Gochnatiinae are at present obscure. It appears to have no close relationships to other African members of the subtribe (Bond, in prep.), which include *Erythrocephalum, Achyrothalamus, Pasaccardoa, Dicoma,* and *Ainsliaea.* The last two genera lack ray florets (unlike *Oldenburgia*); *Erythrocephalum* and *Achyrothalamus* lack or have a reduced pappus (well-developed in *Oldenburgia*). *Pasaccardoa,* which comprises a few annual species, comes closest to *Oldenburgia* in floral characters but is unlike it in vegetative features. It seems likely that *Oldenburgia* is most closely related to a group of largely arborescent South American genera that includes *Chimantaea, Cnicothamnus, Pleiotaxis, Gongylolepis,* and *Wunderlichia,* as well as *Gochnatia,* which also occurs in southeast Asia. There are no counts for any of these genera. Counts for African genera of Gochnatiinae include $n = 12$ and 11 for *Ainsliaea* (Arano, 1957), and there is only a single count for *Dicoma,* $n = 11$, for an Indian member of the genus (Bhandari & Singh, 1977). These genera appear distantly related to *Oldenburgia* on cytological as well as morphological grounds.

Basic chromosome number for Asteraceae is probably $x = 9$ (Raven, 1975; Solbrig, 1977) and the same number is most likely basic for Muti-

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[2] B. A. Krukoff Curator of African Botany, Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166, U.S.A.

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TABLE 1. Chromosome numbers in *Oldenburgia*. All counts are original in this paper. Localities are in the Cape Province, South Africa.

O. grandis (Thunb.) Baillor (syn. *O. arbuscula* DC.): $2n = 36$; cultivated at Kirstenbosch Botanic Gardens, probably from plants from Grahamstown, *Galpin s.n.* (National Botanic Gardens 984/13 in NBG).

O. papionum DC.: $2n = 36$; Wangenheim farm, Rawsonville, rock crevices, *Bond 1722* (NBG).

O. paradoxa Less.: $2n = 36$; Robinsons Pass, Outeniqua Mts., *Bond 1726* (NBG).

sieae and Gochnatiinae as well. *Oldenburgia* appears on present evidence to be a paleotetraploid genus probably allied to a group of South American genera, mostly of the Guayana Highlands, and geographically isolated in Africa. Its basic chromosome number is possibly the same as for the family and tribe.

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